ID-20MF

Reader/Write Module

User Manual

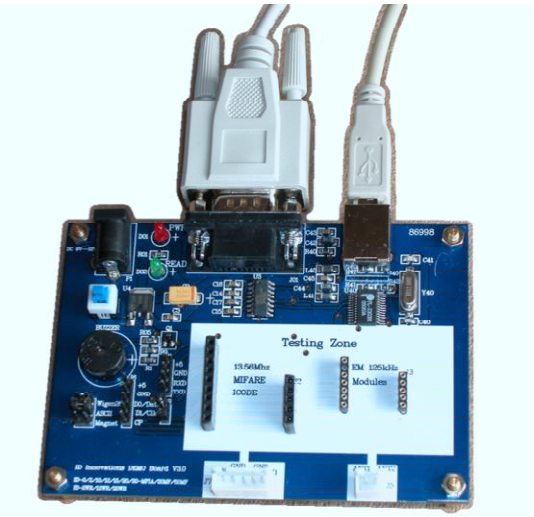
ID Innovations

Advanced Digital Reader Technology

------Better by Design

Summary

The ID-20MF series contactless card Read/Write module is based on Mifare reader IC. They come with the choice of internal antenna or external antenna and are suitable and for embedded applications and general Electronic Devices. The ID-20MF series are user friendly and can be controlled by command from a UART (serial port). Functions are selected by a Pin jumper allowing full control of all functions.



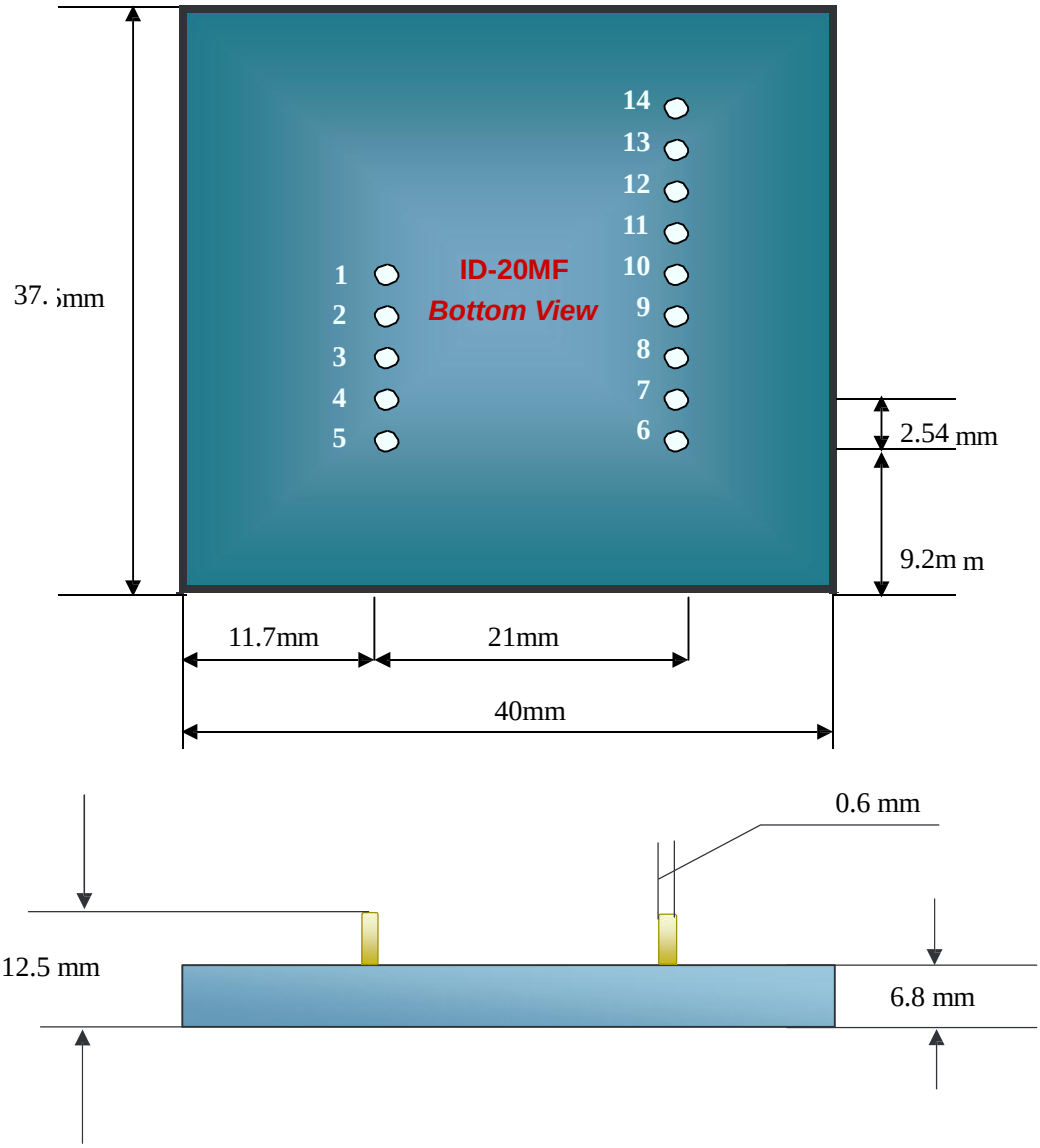
Characteristic

- 2 options: internal antenna or external antenna
- ISP(In System Program)function
- Small outline
- Low power consumption

Specification

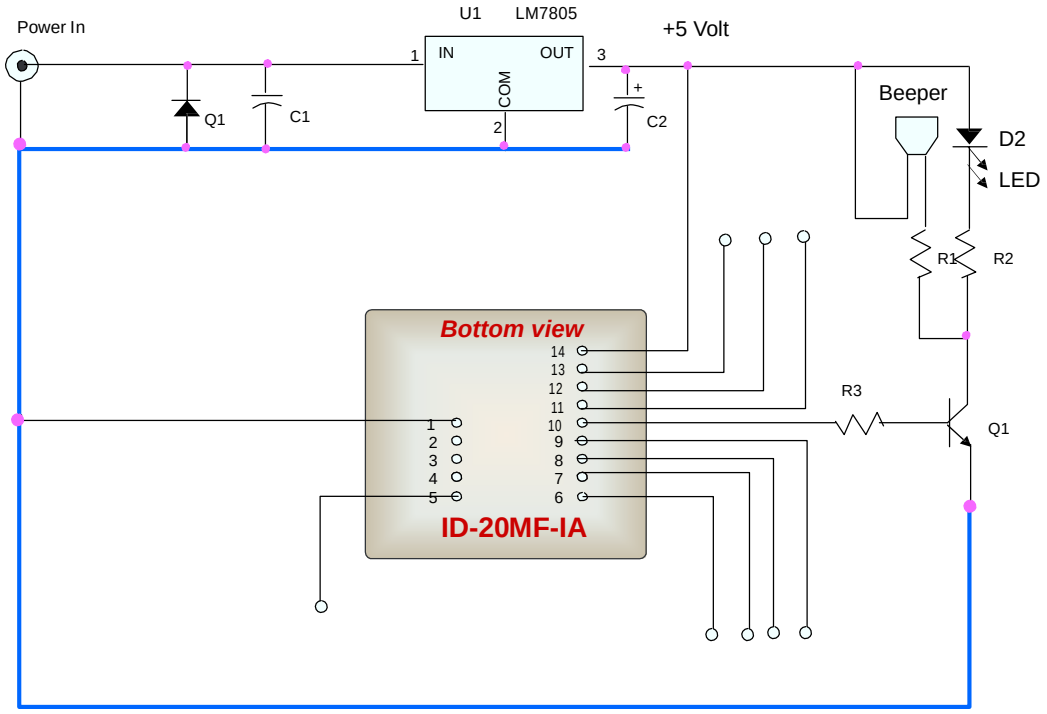
- Support ISO/IEC14443 TypeA cards : Mifare One S50 b) Mifare One S70 c) Mifare Ultra Light
- Model：ID-20MFIA (with internal antenna) ID-20MFWA (without internal antenna)
- Frequency： 13.56 MHz
  Rear/Write distance： internal antenna --30mm external antenna—up to 80mm (tested by ID Innovations cards, range can vary if card made by different manufactory)
- Fast read/write speed.
- Communication Port： (RS232) TTL / 2400-57600BPS N,8,1
- Power： 5V DC
- Current consumption： <60 mA PK<200MA
- weight： 80g
- Operating temperature： -20℃ --- +75℃
- Storage temperature ： -40℃ --- +85℃
- Certification CE, C-TICK, ROHS, FCC

Dimensions and Pins(bottom view)

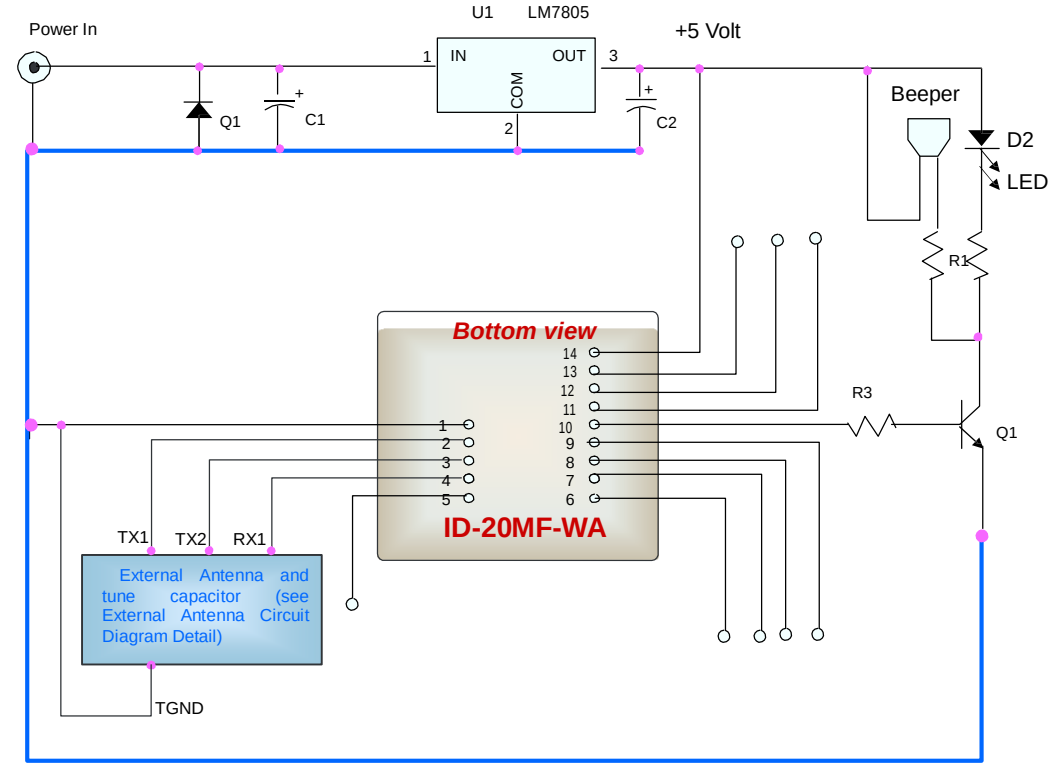


1------GND
2------external antenna TX1
3------external antenna TX2
4------external antenna RX1
5------CP
6------Future
7-----+/- (Format Select)
8-----D1(Data Pin 1)
9----D0(Data Pin 0)
10----LED(LED/BEEPER)
11----NC
12----RXD
13----TXD
14----+5V

Circuit Diagram for the ID20MF-IA



Circuit Diagram for the ID20MF-WA



Pin Description & Output Data Formats

Pin.NO	Description	ASCII	Magnet Emulation (optional)	Wiegand26 (optional)
1	Zero Volts and tuning Capacitor Ground	GND 0V	GND 0V	GND 0V
2	To External antenna TX1	To External antenna TX1	To External antenna TX1	To External antenna TX1
3	To External antenna TX2	To External antenna TX2	To External antenna TX2	To External antenna TX2
4	To External antenna RX1	To External antenna RX1	To External antenna RX1	To External antenna RX1
5	Card Present	No function	Card Present	No function
6	Future	Future	Future	Future
7	Format Selector (+/-)	Strap to GND	Strap to Pin 10	Strap to +5V
8	Data 1	No function	Clock	One Output
9	Data 0	No function	Data	Zero Output
10	LED(LED/BEEPER)	Beeper / LED	Beeper / LED	Beeper / LED
11	No Connection	No Connection	No Connection	No Connection
12	RXD	TTL RXD	No function	No function
13	TXD	TTL TXD	No function	No function
14	DC Voltage Supply	+5V	+5V	+5V

UART Protocols

1 Command frame（9600,N,8,1）

	STX	ID	CMD/STATUS	LEN	DATA	BCC	ETX
VALUE	0x02						0x03
LENGTH	1byte	1 byte	1 byte	1 byte	LEN bytes	1 byte	1 byte
COMMENT	Start Frame	0x00—0xff, Device Address default:0x01	When Sent: CMD When receive: STATUS	**DATA NUM**	DATA	XOR From STX to DATA	Frame end

1 CMD/STAUS、DATA LENGTH、DATA

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
System Command	Link	0x00	0x00		Ok=0 Err=Other	0x00	
	For Example	0x00,0x00			0x00,0x00		
	Reset	0x01	0x00		Ok=0 Err=Other	0x00	
	For Example	0x01,0x00			0x00,0x00		

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
System Command	Change baudrate	0x02	0x01	B Baudrate Baudrate value 2400 B=0x00 4800 B=0x01 9600 B=0x02（default） 14400 B=0x03 19200 B=0x04 28800 B=0x05 57600 B= 0x06	OK=0 Err=other	0x00	
	For example:	0x02, 0x01,0x01			0x00,0x00		
	Buzzer control	0x03	0x04 or 0x00	ABCD A=0x00 buzzer off =0x01 buzzer on =0x02 buzzer on BCD*10 ms BCD: When A=2 the time is given by the value BCD For example, if the time value is 123, then B=0x01, C=0x02, D=0x03	OK=0 Err=other	0x00	
	For example:	A=0 or 1 : 0x03,0x04,0x00 A=2 :0x03,0x04,0x02,0x01,0x02,0x03			0x00,, 0x00,		

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
MF0 IC S50、S70 Command	Request Card	0x10	0x00		Ok=0 Err=Other	0x02	NN 0x4400 = ultra_light 0x0400 = Mifare_One(S50) 0x0200 = Mifare_One(S70) 0x4403 = Mifare_DESFire 0x0800 = Mifare_Pro 0x0403 = Mifare_ProX 0x0033 = SHC1102
	For example:	0x10,0x00,			0x00,0x02,0x04,0x00		
	Halt Module	0x11	0x00		Ok=0 Err=Other	0x00	
	For example	0x11,0x00,			0x00,, 0x00,		
	Read Seris No.	0x12	0x00		Ok=0 Err=Other	0x04	NNNN
	For example	0x12, 0x00,			0x00,, 0x04, 0x1B,0x2C,0x3D,0x4E		
	Read BlockData	0x13	0x08	BAPPPPPP B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6bytes Key	Ok=0 Err=Other	0x0F	DDDDDDDDDDDDDDDD 16 Bytes Data
	For example	0x13,0x08, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,			0x00, 0x0F, 0x11, 0x22, 0x33, 0x44, 0x55, 0x66, 0x77, 0x88, 0x99, 0x00, 0xAA, 0xBB, 0xCC, 0xDD, 0xEE, ,0xFF		

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
MF0 IC S50、S70 Command	Write BlockData	0x14	0x18	BAPPPPPP DDDDDDDDDDDDDDDD B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6bytes Key DDDDDDDDDDDDDDDD 16 Bytes Data	Ok=0 Err=Other	0x00	
	For example	0x14, 0x18, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF, 0x11, 0x22, 0x33, 0x44, 0x55, 0x66, 0x77, 0x88, 0x99, 0x00, 0xAA, 0xBB, 0xCC, 0xDD, 0xEE, ,0xFF			0x00,, 0x00,		
	Verify Key A	0x15	0x0e	BAPPPPPPMMMMMM B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6 Bytes Old Key A MMMMMM: 6 Bytes Old Key A	Ok=0 Err=Other	0x00	
	For example	0x15, 0x0e, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF, 0x11, 0x22, 0x33, 0x44, 0x55, 0x66			0x00,, 0x00,		

:

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
MF0 IC S50、S70 Command	Read Purse	0x16	0x08	BAPPPPPP B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6 Bytes Key	Ok=0 Err=Other	0x04	DDDD
	For example	0x15, 0x0d, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF			0x00, 0x04, 0x11, 0x22, 0x33, 0x44		
MF0 IC S50、S70 Command	Write Purse	0x17	0x0c	BAPPPPPPDDDD B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6 Bytes Key DDDD: 4 Bytes Purse Value	Ok=0 Err=Other	0x00	
	For example	0x17, 0x0c, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0x11, 0x22, 0x33, 0x44,			0x00, 0x00,		

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
MF0 IC S50、S70 Command	Increment Purse	0x18	0x0c	BAPPPPPPDDDD B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6 Bytes Key DDDD: 4 Bytes Purse Value	Ok=0 Err=Other	0x00	
	For example	0x18, 0x0c, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0x11, 0x22, 0x33, 0x44,			0x00, 0x00,		
MF0 IC S50、S70 Command	Decrement Purse	0x19	0x0c	BAPPPPPPDDDD B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6 Bytes Key DDDD: 4 Bytes Purse Value	Ok=0 Err=Other	0x00	
	For example	0x19, 0x0c, 0x01,0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0x11, 0x22, 0x33, 0x44,			0x00, 0x00,		

Command Type	Function	Send			Return		
		Command	DATA Length	DATA	STAUS	DATA Length	DATA
MF0 IC S50、S70 Command	Mult-Block -Data bulk Reading	0x1A	0x09	BAPPPPPPN B: BlockNo. S50:0x00-0x3f S70:0x00-0xff A:=0-PICC_AUTHENT1A =1-PICC_AUTHENT1B =2-NO_AUTHEN PPPPPP: 6 Bytes Key N: Read Block Num (warning: the password in all sectors should be same)	Ok=0 Err=Other	N*16	16*N byte Data
	For example	0x1A, 0x09, 0x00,0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0x0c			0x00, N*16,…….		
	Command Extend						

Card Operating

1. **Warning: Accesss Bits! Read card manual before proceeding or card may be blocked!!!**
2. Block operation:
   a) For STD MF-S50'
   SECOTOR is from 0 to 15.The BLOCK is from 0 to 63
   b) For STD MF-S70'
   SECOTOR is from 0 to 39(1 sector include 4 blocks in the first 32 sectors, and 1 sector include 16 blocks in the last 8 sectors), The BLOCK is from 0 to 255
   c) For S70 or Ultralight
   .You may change the Block in the Protocols**.**

3. **Warning: BLOCK3 of each Sector is a control area which can change the password A and password B. It is very important to write the correct number in this block otherwise will cause the sector damaging!!!**

4. For the safety purpose, the demo software we provide is only available for password A operating which normally use very often. (you can change the password A)

5. For the Password B conducting, we locked the function for safety purpose. Please use the protocol as a reference to operate it.

6. You can switch the module into low consumption mode by using command "HALT Module" and command "REQUEST" before starting to use again.

7. When using the Purse function, you must Write Purse with any amount to initialize it.

8. When you operating the "write block" and "changing the password A", the VB demo will automatically add a "0"before the number you write. When you operating the purse "write" "increase" "decrease", the VB demo will automatically add a "0"followed the number you write.

9. The software will automatically do the Caps for the character you type in.

10. All the writing and password and purse operating can only between "0"—"F".

11. For the Purse "write" "increase" "decrease", the money amount is DDDD 4 bits. For example, 5$ will be 0x00,0x00,0x00,0x05.

12. It is not necessary to have checksum password for the Ultralight card writing. It is A:=2-NO_AUTHEN (Refer to the Protocols)

13. Input the key into EEPROM
    The address of RC500 for password saving is 80--1FF
    There are 6 bytes for Key A or Key B, plus the reversing saving, there are 12 bytes for each and 24 bytes as total.
    There are 384 bytes in EEPROM in total which can be saved in 16 blocks.